DRAFT

PERMIT APPLICATION REVIEW
COVERED SOURCE PERMIT (CSP) NO. 0353-02-C
Application for Permit Renewal No. 0353-06

Company: The Queens Medical Center

Facility: Two (2) 200 hp steam boilers.
Four (4) 3284 bhp Diesel Engine Generators

Location: 1301 Punchbowl Street, Honolulu, Oahu

Mailing 1301 Punchbowl Street, Honolulu, Hawaii 96813

SIC Code: 8062 (General Medical and Surgical Hospitals)

Responsible Official: Mr. Dennis Burns
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Proposed Project

Queen's Medical Center (QMC) facility operates two (2) 200 hp, 8.2 MMBtu/hr (each) steam boilers. These boilers do not operate simultaneously. One is in operation twenty-four (24) hours a day throughout the year (8,760 hours/year). The boilers make steam for sterilization, cooking, hot water generation and generating reheat water for humidity control. The boilers use Synthetic Natural Gas as the primary fuel and #2 diesel as the alternate fuel for gas curtailment, gas supply interruptions, startups or periodic testing. There are no air pollution control equipment or compliance monitoring device on these boilers.

Power back up is provided by using four (4) 2250 kW (3284 bhp @ 1800 rpm) Diesel Engine Generators (Stand By Power only). Fuel use is diesel fuel no. 2 at 157 gal/hr for each DEG.

The diesel engine generators are standby units and will only operate when HECO requests QMC to disconnect from the power grid and during power outages. During standby operation, all Four (4) diesel engine generators will start up. After ten (10) minutes, one of the diesel engine generators will shut down and the remaining three (3) diesel engine generators will power the facility.

The operation of the diesel engine generators for 8760 hrs/yr will make the QMC facility a major stationary source, hence the fuel consumption of the four (4) diesel engines will be limited to a combined total 1,000,000 gallons per rolling twelve (12) months.

Additionally, two (2) 1 MW emergency diesel engine generators; and two (2) fuel storage tanks is also in the premises, consisting of;

- One (1) 15,000 gallon diesel fuel storage tank; and
- Two (2) 20,000 gallon diesel fuel storage tanks,

which are deemed insignificant activities pursuant to HAR §11-60.1-82(f)(1).

Equipment Description

The following equipment will be covered under this permit.

1. Two (2) 8.2 MMBtu/hr (200hp) fire tube steam boilers, Cleaver Brooks model no. CB200-200-150,
   a. Maximum Design Capacity – 8.2 MMBtu/hr fire tube steam boilers
   b. Cleaver Brooks model no. CB200-200-150.
   c. Serial nos. OL103324, and OL 103325
   d. Fuel Use – 977,353 Therms/yr Synthetic Natural Gas; or
   e. #2 diesel, burning a maximum of 60 gallons/hour (per CB email 5/6/15)

2. Four (4) 2250 kW (3,286 bhp) Caterpillar Diesel Engine Generator sets, model no. 3516B with serial nos. PBR00266 (Unit -1), PBR00267 (Unit-2), PBR00268 (Unit -3), PBR00269 (Unit -4). All were manufactured in November 2006. Each diesel fuel rate is 157.5 gal/hr.

Applicable Requirements

Hawaii Administrative Rules (HAR)
Title 11 Chapter 59, Ambient Air Quality Standards
Title 11 Chapter 60.1, Air Pollution Control
- Subchapter 1 - General Requirements
- Subchapter 2 - General Prohibitions
  - 11-60.1-31, Applicability
  - 11-60.1-32, Visible Emissions
  - 11-60.1-38, Sulfur Oxides from Fuel Combustion
- Subchapter 5 - Covered Sources
- Subchapter 6 - Fees for Covered Sources, Noncovered Sources, and Agricultural Burning
  - 11-60.1-111, Definitions
  - 11-60.1-112, General Fee Provisions for Covered Sources
  - 11-60.1-113, Application Fees for Covered Sources
  - 11-60.1-114, Annual Fees for Covered Sources
  - 11-60.1-115, Basis of Annual Fees for Covered Sources
- Subchapter 9, Hazardous Air Pollutant Sources
- Subchapter 10, Field Citations

Prevention of Significant Deterioration (PSD) - 40 CFR Part 52, §52.21
This plant is not subject to PSD because it is not a major stationary source as defined as one of the 28 source categories in 40 CFR §52.21 and HAR, Title 11, Chapter 60.1, Subchapter 7, and the facilities potential to emit is less than 250 tons/year.

Compliance Assurance Monitoring (CAM) - 40 CFR 64
This plant not subject to CAM because the facility is not a major source. The purpose of CAM is to provide a reasonable assurance that compliance is being achieved with large emissions units that rely on air pollution control device equipment to meet an emissions limit or standard. Pursuant to 40 CFR Part 64, for CAM to be applicable, the emissions unit must:

(1) Be located at a major source
(2) Be subject to an emissions limit or standard
(3) Use a control device to achieve compliance
(4) Have potential pre-control emissions that are 100% of the major source level
(5) Not otherwise be exempt from CAM.

Standards of Performance for New Stationary Sources (NSPS) - 40 CFR Part 60

Subpart D_c - Standards of Performance for Small Industrial- Commercial Institutional Steam Generating Units does not apply because the maximum design heat input of each boilers is less than 10 MMBtu/hr.

Subpart IIII – Standard of Performance for Stationary Compression Ignition (CI) Internal Combustion Engines (ICE) applies to stationary CI Engines ordered after July 11, 2005, and manufactured after April 1, 2006. The diesel engines were ordered in December 2005, and manufactured in November 2006, hence it is subject to Subpart IIII. Each 16-cylinder engine has a total displacement of 69 liters. Therefore, the displacement of each cylinder is 69/16= 4.31 liters.

National Emission Standards for Hazardous Air Pollutants (NESHAP) – 40 CFR Part 61
This source is not subject to NESHAPs because there are no standards in 40 CFR Part 61 applicable to this facility.

National Emission Standards for Hazardous Air Pollutants (NESHAP) – 40 CFR Part 63
Subpart ZZZZ - NESHAP for stationary Reciprocating Internal Combustion Engine (RICE)
40 CFR 63, Subpart ZZZZ National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines is applicable to the diesel engines. The diesel engines are considered new engines under ZZZZ because they were constructed after June 12, 2006. New Stationary RICE located at an area source must meet the requirements of this part by meeting the requirements of 40 CFR Part 60, Subpart IIII.

National Emission Standards for Hazardous Air Pollutants – 40 CFR Part 63
Subpart JJJJJJ - Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources. This regulation is not applicable to this source because the boilers will be fired on diesel no. 2 only during periods of gas curtailment, gas supply interruptions, startups, or periodic testing. Periodic testing will not exceed a total of forty-eight (48) hours during any calendar year.

Annual Emissions Reporting (DOH in-house)
Annual emissions reporting is required by the Clean Air Branch from those facilities that have facility wide emissions exceeding in-house reporting levels and for all covered sources. Annual emissions reporting is required because this facility is a covered source.

Best Available Control Technology (BACT)
This source is not subject to BACT analysis because BACT analysis is required for new sources or modifications to sources that have the potential to emit or increase emissions above significant levels considering any limitations as defined in HAR §11-60.1-1. There are no proposed modifications.

Synthetic Minor Source (SMC) - A synthetic minor source is a facility that is potentially major, as defined in HAR §11-60.1-1, but is made non-major through federally enforceable permit conditions. This facility is not a synthetic minor source because QMC is a major source, thus it is not a synthetic minor.

AERR (Air Emission Reporting Rule):
40 CFR part 51, Subpart A – Air Emission Reporting Requirements, determines the emissions reporting frequency for AERR based on the potential emissions of each pollutant from the facility. The NO_X emissions from the facility exceed the AERR's trigger levels for a type B source as defined in 40 CFR 51 (Table 1 to Appendix A of Subpart A) and as such the facility is subject to AERR (Triennial reporting).

AERR Applicability

	four 3,286 hp DEGs[a] burning fuel no. 2	Two 8.2 MMBtu/hr Boiler[b]	Two (2) Emergency DEGs @ 500 hrs/yr each (Insignificant)	Total Facility Emission[c]	AERR Trigger
Pollutant	**(TPY)**	**(TPY)**	**TPY**	**(TPY)**	**(TPY)**
PM2.5	3.35	0.44	0.6	**4.39**	100
PM10	4	0.57	0.6	**5.17**	100
PM	4.88	1.05	0.6	**6.53**	100
SO_2	0.11	37.32	2.6	**40.03**	100
CO	59.5	5.92	4.4	**69.82**	1000
NOx	209.16	10.51	16.4	**236.07**	100
VOC	0.63	0.77	0.4	**1.8**	100

[a]Based on total combined fuel consumption of 1,000,000 gal/yr.
[b]Represent worst pollution emission of boiler firing fuel oil no. 2 or SNG.
[c]Represent facility's all point-of-source emissions, including insignificant sources.

Insignificant Activities/Exemptions

The facility currently has two (2) 1 Megawatt emergency diesel engine generators. These generators are fired on diesel fuel no. 2 and provide electricity only during commercial power outages and is considered insignificant activities.

The emergency diesel engine generator emissions were calculated using both DEGs operating 500 hours per year. Except for PM_{10} and SO_2, emissions from the diesel engine generator were estimated using the not to exceed emissions data from the manufacturer. PM_{10} and SO_2 emissions were estimated using the AP-42 emission factor from section 3.4, revised 10/96.

Table 3 summarizes the emissions from the Permitted equipment and the emissions from the two emergency DEGs.

The facility also has two (2) fuel storage tanks on the premises, which consists of:
- One (1) 15,000 gallon diesel fuel storage tank; and
- Two (2) 20,000 gallon diesel fuel storage tanks.

They are considered insignificant activities.
Emission from all permitted sources and insignificant activities amount to less than major stationary source levels.

Alternate Operating Scenarios

There were not alternate operating scenarios proposed in the application.

Air Pollution Controls

The source does not use any pollution control devices.

Project Emissions:

The emissions from the two 8.2 MMBtu/hr steam boilers were estimated using AP-42 emission factors. Section 1.4-1, revised 7/98, was used to estimate emissions from firing on synthetic natural gas (primary fuel). The heating value was assumed to be 1,050 Btu/scf. Section 1.3-1, revised 9/98, was used to estimate emissions from burning diesel (emergency back-up fuel). Emissions from burning diesel fuel no. 2 were based on a heating value of 137,000 Btu/gal. Emissions estimates represent operating both 8.2 MMBtu/hr steam boilers for 8,760 hours per year.

Diesel engine generator NO_x emission was calculated using manufacturer's data. All other diesel engine generator emissions were calculated using AP-42 section 1.3 and 3.1.

HAP emissions were estimated using AP-42 section 3.4, revised 10/96.

Total Facility Pollutant Emission

Pollutant	four 3,286 hp DEGs	four 3,286 hp DEGs[a]	Two 8.2 MMBtu/hr Boiler	Two 8.2 MMBtu/hr Boiler	Total Facility Emission[b] (w/o Limits)	Total Facility Emission[d] (with Limits)
	Diesel No. 2 (TPY)	Diesel No. 2 (TPY)	SNG (TPY)	Diesel No. 2 (TPY)	8,760 hr/yr (TPY)	(TPY)
PM2.5	18.45	3.35	0.13	0.44	18.89	**3.79**
PM10	22.07	4	0.13	0.57	22.64	**4.57**
PM	26.84	4.88	0.54	1.05	27.89	**5.93**
SO_2	5.83	1.06	0.04	37.32	43.15	**38.38**
CO	365.84	59.5	5.92	2.63	371.76	**65.42**
NOx	1232.29	209.16	7.04	10.51	1242.8	**219.67**
VOC	3.47	0.63	0.77	0.29	4.24	**1.4**
HAPs	0.61	0.11	0.39	0.0337	0.6437	**0.50**

[a] Based on total combined fuel consumption of 1,000,000 gal/yr.

[b] Based on unlimited fuel consumption for DEGs and worst case emissions from the boilers firing SNG or fuel no. 2.

[c] Does not include insignificant emission sources.

[d] Based on diesel engine generators total combined fuel consumption of 1,000,000 gal/yr and worst case emission from boilers firing SNG or fuel oil no. 2.

GHG Calculations[a]

Source	Fuel input	Pollutant	EF (g/gal) per IPCC[b]	GHG Total (TPY)	GWP CO_2e[1]	Total Units (ea)	CO_2e Total (TPY)
Two 8.3 MMBtu Boilers. Diesel Fuel input each (gal/hr)	60.00	CO2	10,210.00	5,366.38	1.00	5,366.38	10,732.75
		CH4	0.41	0.22	25.00	5.39	10.77
		N_2O	0.08	0.04	298.00	12.53	25.06
Four 3286 bhp Diesel Generators. Limited (gal/year)	1,000,000.00	CO2	10,210.00	10,210.00	1.00	10,210.00	10,210.00
		CH4	0.41	0.41	25.00	10.25	10.25
		N_2O	0.08	0.08	298.00	23.84	23.84
Total GHG Emissions							21,012.68

[a]Using 1 million gallon per year for four DEGs and 8,760 hours operations/year for both boilers.
[b]Per IPCC, 4 April, 2014 list.

Air Quality Assessment:

An ambient air quality assessment was previously performed for the operations of both boilers for 8,760 hrs/yr and the four DEGs at 1,000,000 gal/yr fuel consumption limit. Compliance with the standards was demonstrated. An ambient air quality modeling assessment was not required for this review since there are no proposed modifications.

Significant Permit Conditions

1 The boilers use Synthetic Natural Gas as the primary fuel and #2 diesel as the alternate fuel during gas curtailment, gas supply interruptions.

2 Power back up is provided by using four (4) 2250 kW (3284 bhp @ 1800 rpm) Diesel Engine Generators (Stand By Power only). The proposed diesel engine generators operating at 8,760 hrs/yr would make the QMC facility a major stationary source, hence the fuel consumption of the four (4) diesel engines will be limited to a combined total 1,000,000 gallons per rolling twelve (12) months.

3 The diesel engine generators shall be fired only on ultralow sulfur diesel fuel with the following specifications:

a. Maximum sulfur content of 0.0015% by weight; and
b. Minimum cetane index of 40 or maximum aromatic content of thirty five (35) percent.

Reason: These are requirements for CI RICE categorized as new under 40 CFR Part 63, Subpart ZZZZ.

4. Periodic testing of the boiler's on liquid fuel shall not exceed a combined total of 48 Hours during any calendar year pursuant to 40 CFR 63, Subpart JJJJJJ, §63.11237.

Conclusion and Recommendation:

QMC has four diesel engine generators for standby purposes and two (2) boilers. The diesel engine generators will only operate if HECO requests them to come off the grid and during power outages. The diesel engines have a fuel consumption limit which prevent it from becoming a major stationary source. Emissions were based on the diesel engines consuming all of the allowable fuel. QMC does not expect the diesel engines to consume all of the allowable fuel and the actual emissions from the facility should be much less than estimated.
Although only one boiler operates at a time, the review is based on operation of both boilers for 8,760 hrs/year. Issuance of a covered source permit is recommended based on the information provided by the applicant, subject to thirty-day (30-day) public comment period and forty-five-day (45 day) EPA review.

Jensen I. Kennedy
June 8, 2015